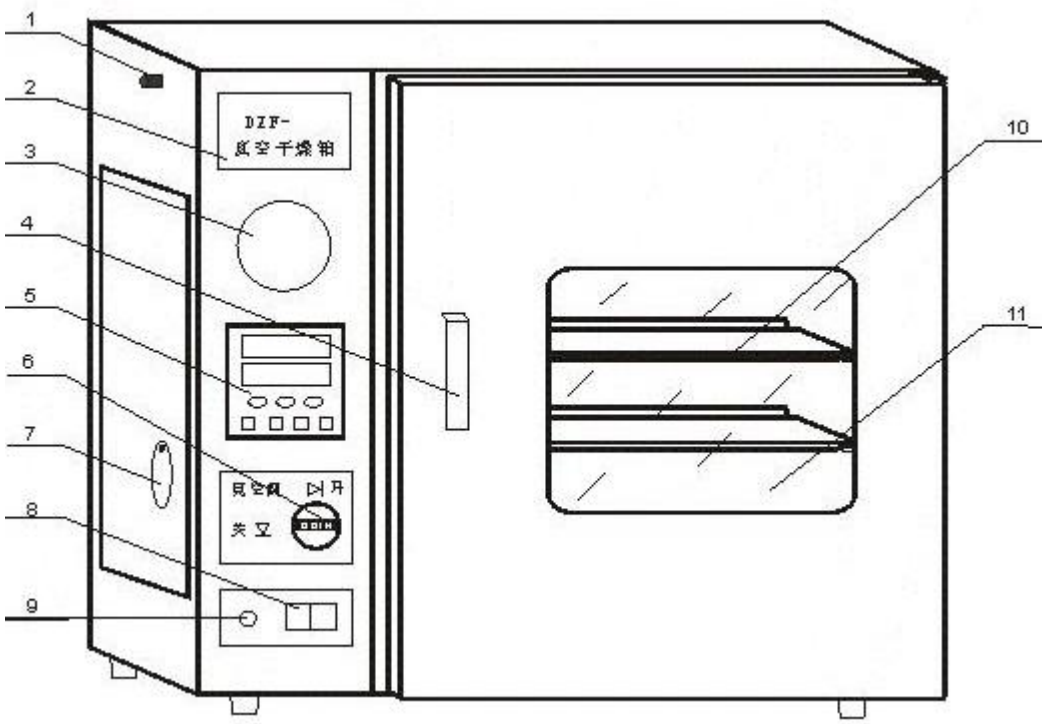
厦门嘉利施电子科技有限公司
XIAMEN AOT ELECTRONICS TECHNOLOGY CO.,LTD

Vacuum Drying Oven

Operating Manual

Model：AOT-DZF-6050

Schematic Diagram



1. Air outlet 2. Logo 3. Vacuum meter 4. Handle 5. Temp controller 6. Vacuum valve
7. Pumping hole 8. Power switch 9. Power light 10. Shelves 11. Observation Window

Application

For factories and mining enterprises, universities, scientific research and various laboratories, etc. to dry and heat the articles under vacuum conditions. Heating and drying items under vacuum has the following advantages:

1.The drying temperature can be reduced (low pressure, low temperature).

2.Avoid some items from heating and oxidation, and no dust particles are damaged.

3.Avoid heating the air to kill biological cells.

Specifications

Voltage Input	220V AC 50Hz (110V/60Hz)
Temperature Range	RT - 200℃
Temperature Fluctuaion	±1.0℃
Vacuum Degree	≤133Pa
Rated Power	1400W
Inner Size	415*370*345mm
Inner Material(cold-rolled sheet)	Stainless steel (1Cr18Ni9Ti)

The technical parameters in the table are all under the conditions of an ambient temperature of 25°C, a relative humidity of not more than 85%, and a vacuum degree of not less than 0.1Mpa, measured with a mercury thermometer with an accuracy of ±0.1℃. The mercury tip of the thermometer must be in good contact with the surface of the shelf in the box.

Structure and working principle

DZF-6050 series vacuum drying oven. The vacuum box is composed of four parts: the box body, the inner tank, the vacuum system and the temperature control system.

The box body is made of high-quality thin plate, and the surface is sprayed with plastic treatment, and the color is bright. The inner tank is made of general galvanized steel plate or stainless steel plate. The shape of the inner cavity is a square with a semi-circular arc inner corner. Fill the space between the inner and outer boxes with ultra-fine glass wool as heat insulation material; The middle of the box door adopts a double-layer glass structure, which is convenient for observing the dried items in the box; A thick tempered glass is installed on the inside of the door, and a long cylindrical door buckle is used at the same time. Utilize the distance between the door buckle and the tempered glass, so that the rubber sealing ring can be pressed tightly after the door is closed, so as to ensure no air leakage when vacuuming. **(Note: The**

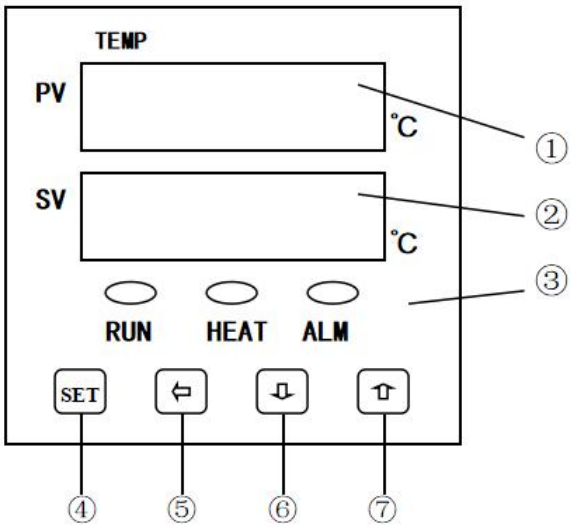
rubber seal ring is not oil-resistant!)

The vacuum system is composed of a vacuum pump, a vacuum gauge, a vacuum valve, and an air release valve. According to the needs of users, can be equipped with dry filter tank (device) or air inlet valve, etc., and the vacuum pump of other types of vacuum boxes is included as an optional accessory. (The pumping rate index of the vacuum pump provided by the user cannot be less than 2L/S)

The temperature control system consists of a sensor (Pt100 platinum resistance), a temperature controller, a heater, etc.,When the temperature controller receives the sensor output resistance signal (100Ω at 0℃, 0.3Ω/℃), it will display the actual temperature in the working room on the PV screen. When the input signal is less than the set value, the power tube (triac) is turned on, so that the heater obtains sufficient electric power to generate heat. On the contrary, the power tube has no electric power output and the heater does not heat. The temperature controller has PID adjustment output characteristics, adjustable electric power output, error correction of measuring temperature, timing control and other functions, as well as safety deviation alarm function with light and automatic cut-off over temperature.

Temperature controller operation method

1.Panel description



① PV Display ② SV Display

③ Indicator light

RUN - Run indication

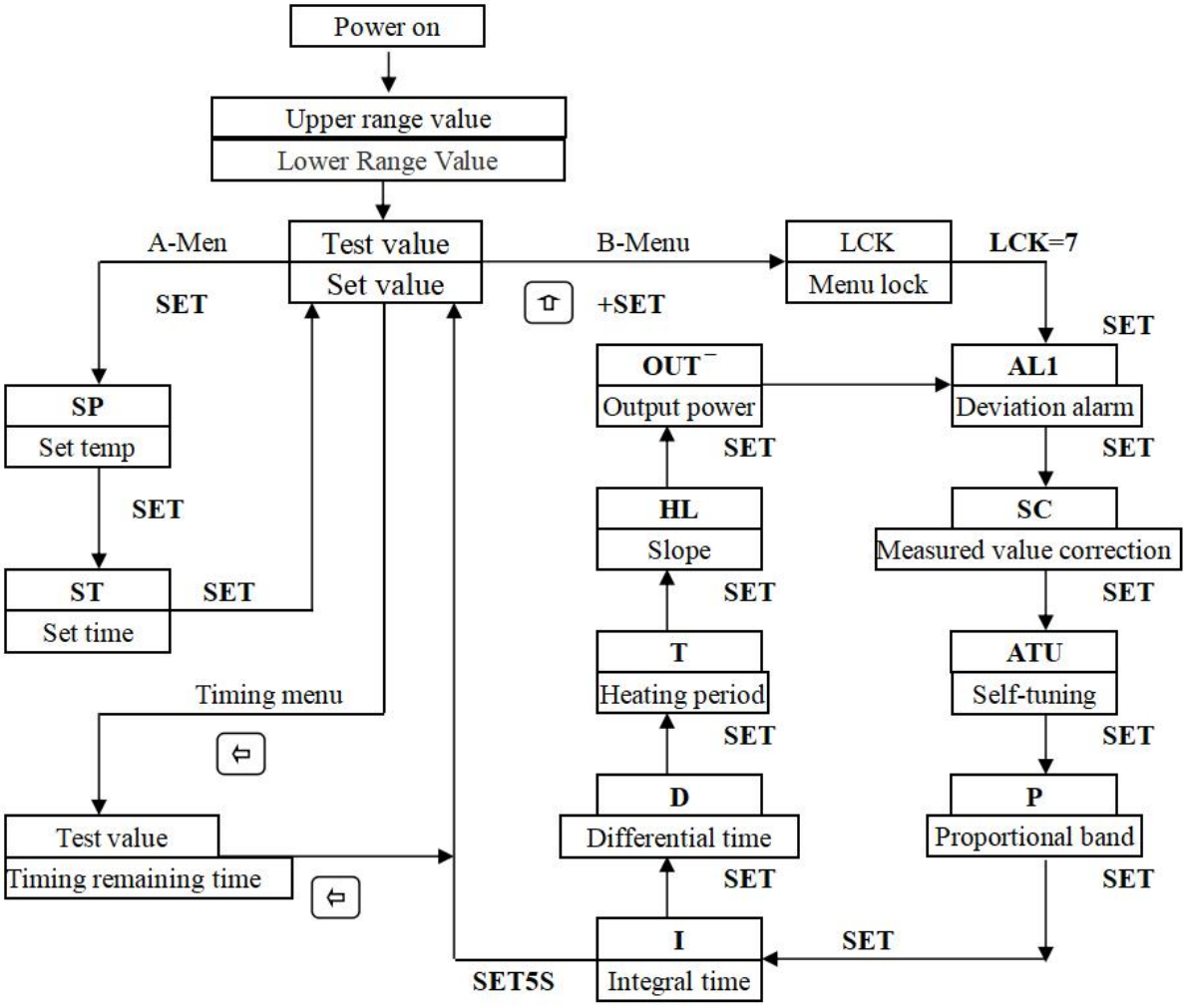
HEAT - Heating indication

ALM - Alarm indication

④ Function ⑤ Shift key

⑥ Minus/Down ⑦ Plus/Up

2.The calling order of each function



3.Instructions for use

3.1 Temperature setting

a. Under normal working conditions, press the SET button once to enter the temperature setting state. At this time, the PV display shows SP and the first digit of the SV display flashes;

b. Press the shift key to shift the flashing to the desired setting position;

c. Press the minus key or the plus key to adjust the number to the desired value;

d. Press the SET key twice, the meter returns to normal working state, the temperature setting is completed, and the meter runs according to the new set value.

3.2 Timing function

a. In the normal working state, press the SET button twice to enter the timing setting state. At this time, the PV display shows ST and the SV display shows 0, and flashes;

b. Press the shift key to shift the flashing to the desired setting position;

c. Press the minus key or the plus key to adjust the number to the desired value;

d. Press the SET button once, and the meter will enter the timing running state, and the running indicator will flash;

e. The timing function is countdown operation. In the timing operation state, press the shift key once, and the SV display screen will display the timing remaining time;

f. The remaining time of the timing is reset to zero, and the meter enters the timing end state. At this time, the SV display shows End and flashes, and all the indicators except the wind speed indicator are off;

g. In the state of timing end, press the SET button once, and the meter will return to normal working state.

h. In the timing end state, because the temperature control part of the meter stops working, the measured value displayed on the PV display screen will drop to the ambient temperature, which is a normal phenomenon.

i. If you do not need to use the timing function, please be sure to set the timing time to zero.

j. During the operation of the timing function, if an unexpected power failure occurs, the remaining timing will be automatically reset to zero after the power is turned on again.

k. The timing range of this equipment: 1～9999 minutes or 1～9999 hours. (Please specify when ordering!)

3.3 Self-tuning function

If there is a large temperature overshoot or large temperature fluctuation during the temperature control process, please start the self-tuning function according to the following operations

a. Turn off the power switch and open the door to allow the equipment to cool to ambient temperature naturally;

b. Close the door, turn on the power switch, and set the temperature to the usual temperature value;

c. According to the control parameter adjustment method, adjust the self-tuning parameter to 1;

d. d. In the normal working state, press and hold the minus button for 5 seconds to enter the auto-tuning

state. At this time, the PV display shows ATU and flashes;

e. After the auto-tuning is over, the meter will automatically return to the normal working state.

f. In the auto-tuning state, pressing any key is invalid.

3.4 Control parameter adjustment method

a. Press the plus key and the SET key at the same time, the PV display shows LCK;

b. Press the plus key to make the SV display display 7;

c. Press the SET button again to make the PV display display the prompt of the control parameter that needs to be adjusted;

d. Press the plus or minus key to make the SV display display the value required by the control parameter, and all control parameters can be adjusted at one time;

e. Press the SET key for more than 5 seconds to return to the normal working state; at this time, the temperature controller executes the newly modified parameters.

Note: During the adjustment of the control parameters, if no key is pressed for 30 seconds, the meter will automatically return to the normal working state, but the changed data will be deemed invalid.

Since the products have been strictly tested before they leave the factory, no corrections are generally required. However, in the following cases, the function parameters can be modified to meet the factory standard: 1. At the first boot; 2. The product has been used for a period of time; 3. Bad use environment;

4. The ambient temperature used is inconsistent with the ambient temperature during manufacturing;

5. When the value changes before and after using the control temperature.

3.5 The error correction method between the measured temperature and the actual temperature in the box

a. Put the mercury thermometer (mercury thermometer with 0.1℃ accuracy) into the working room, and the mercury end should be placed in the geometric center of the room; the reading of the mercury thermometer is the actual temperature.

b. Turn on, when the device runs to a constant temperature state (about 1 to 2 hours), compare the difference between the actual temperature and the temperature displayed on the PV display. The difference (actual temperature-PV display value) is the value that the measured value correction parameter SC needs to modify, namely: SC = original SC value + (actual temperature-PV display value)

c. Calculate the SC value and input it according to the above formula.

3.6 Control parameter table

Prompt	Name	Set Range	Description	Factory default
AL1 / AL1	Deviation alarm	-99.9～999.9	When the temperature exceeds the value of SP+AL1, the ALM light will be on, the buzzer will sound, and the heating power will be cut off	**3.0**
SC / SC	Measurement correction	-99.9～100.0	The actual temperature in the measuring box is compared with the PV display temperature to correct the display error	**-5.0**
ATU / ATU	Self-tuning	0 / 1	0：OFF，1：ON。 A group of PID parameters can be self-tuned.	**0**
P / P	Proportional band	0～100.0	Heating proportional control, It can improve the control accuracy of the system and eliminate the static error.	**3.0**
I / I	Integral time	1～4320	Integral action time constant	**480**
d / d	Derivative time	0～1200	The differential action time constant, generally d takes (1/4) times I.	**120**
T / T	Heating period	1～60	The thyristor output is generally 2 to 3 seconds. For equipment with large remaining power, increasing T can reduce the static error of PID control.	**3**
HL / HL	Slope	0.500～1.500	Ensure the consistency of temperature control accuracy across the entire range	**1.000**
OUT / OUT	Output power	0～100	Adjustable heater output power	**60**

The products have been strictly tested before leaving the factory. When the technical indicators of the drying oven meet the requirements and work normally, no correction is generally required.

Instructions

1. Use environment requirements

a) Temperature: 5～40℃

b) Relative humidity: ≤85%RH

c) Power supply voltage: AC220V±10% 50Hz

d) There is no strong vibration and corrosive gas around

2. Vacuum debugging

a) Close the door and screw the door handle in place, close the air release valve (twist the hole on the rubber plug and the hole on the air release valve by 90°), open the vacuum valve (rotate 90° counterclockwise), The vacuum valve switch may be tight after one use, and it can be rotated by force.

b) Connect the vacuum drying box suction pipe (outer diameter: Φ16mm) and the vacuum pump (2XZ-2 type, inlet outer diameter Φ16mm) with a vacuum connecting pipe (inner diameter: Φ16mm wall thickness: 10mm), which is a random accessory, firmly. Turn on the vacuum pump power and start pumping. When the vacuum gauge indicates -0.1Mpa, first turn off the vacuum valve and then turn off the vacuum pump power to prevent the vacuum pump oil from flowing back into the working chamber. At this time, the chamber is in a vacuum state.

3. Vacuum box debugging

After the vacuum level adjustment is completed, the following operations can be performed.

a. Turn on the power of the vacuum box, the power indicator should be on at this time, the temperature controller is powered on for self-checking, the PV screen displays the measured temperature in the working room, and the SV screen displays the temperature set at the factory. The RUN and HEAT lights on the temperature controller should be on, indicating that the meter has entered the heating state.

b. Modify the set temperature

b1. Press the function key (SET) of the temperature controller; after the SP character is displayed on the PV screen, the minus/ plus key can be used to modify the set temperature. The 2 and 3 meters should be set and modified separately, similar to the following).

b2.After the modification is completed, press the SET button again, the PV screen will display ST characters and set the timing time. **If you do not use the timing function, still let ST=0**

b3. Press the SET button again to make the PV screen display the working temperature and the SV screen to display the new set temperature. The RUN and HEAT lights of the meter are on, and the meter re-enters the working state of heating at this time.

c. When the temperature in the working room is close to the set temperature, the HEAT light flashes on and off, indicating that the heating enters the PID adjustment stage. Sometimes the measured

temperature of the instrument exceeds the set temperature, and sometimes it is a normal phenomenon that the temperature is lower than the set temperature. When the measured temperature is close to or equal to the set temperature, after another 1 to 2 hours, the studio enters a constant temperature state, and the article enters the drying stage.

d. When the required temperature is low, the secondary setting method can be used. For example, the required working temperature is 70°C, first set 60°C for the first time, and then set 70°C for the second time after the temperature overshoot starts to fall back, this can reduce or even eliminate the phenomenon of temperature overshoot, and enter a constant temperature state as soon as possible.

e. When the article is dried, turn off the power, if the temperature is accelerated, open the vent valve to make the vacuum degree 0, wait for about 5 minutes and then open the door.

4. If the humidity of the dry objects in the working room is high, the moisture generated will affect the performance of the vacuum pump. It is recommended to put a "dryer/filter" in series between the drying box and the vacuum pump. Our company can equip a dryer with an external dimension of Φ120×300mm and an outer diameter of Φ16 as required.

5. If it is necessary to add inert gas such as nitrogen during the drying process, it should be specified in the contract and an air inlet valve should be added.

Note:

1. If the vacuum pump is normal and meets the technical requirements and cannot be vacuumed, open the door of the box and use the wrench in the product accessories to twist the door buckle on the box in a circle to shorten it, and then close the door again.

2. This vacuum drying oven cannot be used as an electric heating drying oven. Because the working room is not in a vacuum state, the measured temperature has a great error with the actual temperature in the working room.

Precautions

1. The outer shell of the vacuum box must be grounded effectively to ensure safe use.

2. The vacuum box should be used in an environment where the relative humidity is ≤85%RH, and there

is no corrosive gas around, no strong vibration source and strong electromagnetic field.

3. There is no explosion-proof and anti-corrosion treatment in the vacuum box working room, and no items that are flammable, explosive, or prone to corrosive gases are allowed to be dried.

4. The vacuum pump cannot work for a long period of time, so when the vacuum degree reaches the requirement of dry goods, the vacuum valve should be closed first, and then the power supply of the vacuum pump should be turned off. When the degree of vacuum is less than the requirement of dry items, open the vacuum valve and the power supply of the vacuum pump to continue vacuuming, which can extend the service life of the vacuum pump.

5. If the dry items are wet, it is better to add a filter between the vacuum box and the vacuum pump to prevent the wet gas from entering the vacuum pump and causing the vacuum pump to malfunction.

6. If the dry items are changed into light weight and small size (small particles) after drying, the vacuum port in the working chamber should be added with a barrier net to prevent the vacuum pump (or solenoid valve) from being sucked in by the dry matter.

7. After the vacuum box is used for many times, it will not be able to vacuum. At this time, the door seal should be replaced or the door buckle on the box body should be adjusted to solve the problem. When the drying temperature of the vacuum box is higher than 200℃, slow air leakage will occur. At this time, open the back cover of the box and use an Allen wrench to loosen the heater base, change the sealing ring or tighten the heater base to solve the problem.

8. If the rubber stopper of the air release valve is difficult to rotate, it can be lubricated with a proper amount of grease inside. (Like petroleum jelly)

9. Except for maintenance, the left side box cover cannot be removed to avoid damage to the electrical control system.

10. The vacuum box should always be kept clean. Do not wipe the glass of the door with a reactive chemical solution, and should be wiped with a soft cotton cloth.

11. If the vacuum box is not used for a long time, wipe the exposed electroplated parts and apply neutral grease to prevent corrosion. Put on a plastic film dust cover and place it in a dry room to prevent electrical components from being damaged by moisture and affecting use.

12. If there is an abnormal phenomenon during use, please cut off the power supply and get in touch with our company in time!

Fault handling

Failure phenomenon	Reason speculation	Approach
No power on boot	No power to external power socket	Check if the circuit is tripped and if the socket is good
	The power cord is not plugged in or disconnected	Replug or repair the power cord
	The fuse tube is not installed or broken	Check that there is no short circuit in the vacuum box, and replace the fuse tube (the instrument power transformer short circuit, heater short circuit, and ground short circuit all cause the fuse to blow).
Meter PV screen display"□□□□"	Temperature sensor Pt100 is broken	Check Pt100 and replace it (0℃ is 100Ω, 0.3Ω/℃)
	Temperature sensor wiring is off	Rewiring
	The measuring range of the meter is wrong	Reset
Does not heat up	Set temperature is low	Set temperature SV≥RT+10℃ RT is (room temperature)
	Wiring of the meter output circuit is off	Rewiring
	The temperature controller has no output signal or is broken or the thyristor is broken	Replace it
	The electric heater is broken (open circuit, short circuit)	Replace it
Does not heat up	The timing function is enabled or the setting is incorrect	ST=0 or ST=(heating + constant temperature) time
The temperature is out of control or the error between the set temperature and the measured temperature is out of tolerance, resulting in static difference and overshoot	Temperature controller output out of control	3041 or BTA is broken, replace it
	Does not meet the conditions of use	SV≥RT+10℃
	Poor contact of Pt sensor	Clear contact resistance
	The relevant parameter settings are incorrect	Re-set the relevant parameters such as P, etc.
The measured temperature is out of difference with the actual temperature in	No vacuum	Pump vacuum degree
	The temperature sensor of the mercury meter is not on the shelf	Reposition

the box	Instrument or parameter changes	Re-correct the SC and HL parameters
Can't vacuum	The vacuum pump is not the correct model and specification	The pumping rate should be no less than 2 liters/sec
	Various connecting pipes (heads) are loose, and the inner diameter is too small	Re-select a suitable inner diameter connecting pipe and tighten the joints firmly
	The vacuum gauge is broken	Replace it
	The door is not closed tightly	Adjust the distance of the door buckle
	The door seal rubber is aging and loses its elasticity	Replace door seal
	The position of the air release valve and the vacuum valve is incorrect	Adjust position
Leakage (vacuum degree drops from -0.1Mpa to greater than -0.092Mpa within 24 hours）	Air leakage in various connecting pipes	Replace after inspection
	Except for models 6050, 6050B, 6051, and 6053, the deformation of the heater "O" seal ring causes uncompressed phenomenon	Tighten the heater base (on the back of the inner tank) with an Allen wrench or replace the "O" seal
	The position of the air release valve is incorrect	Place in the right place
	Vacuum valve leaks	Replace it
	The solenoid valve is not closed tightly and leaks (applicable to 6090, 6210 type)	Replace it

End